

WHAT IS CLAIMED IS:

1. A particle beam therapy system comprising:

a charged particle beam generator for emitting a charged particle beam;

a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

a plurality of beam transport systems communicated with said charged particle beam generator and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms; and

a control information forming unit for forming control command information, which includes control information for a plurality of elements provided in the beam transport system introducing the charged particle beam to the irradiation unit in the selected treatment room, by using at least treatment room information representing the selected treatment room and treatment plan information specified depending on patient identification information.

2. A particle beam therapy system comprising:

a charged particle beam generator for emitting a charged particle beam;

a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

a first beam transport system connected to said charged particle beam generator and transporting the charged particle beam emitted from said charged particle beam generator;

a plurality of second beam transport systems provided respectively corresponding to said treatment rooms, connected to said first beam transport system, and transporting the charged particle beam transported through said first beam transport system to the corresponding irradiation units disposed in said treatment rooms; and

a control information forming unit for forming control command information, which includes control information for a plurality of elements provided in the second beam transport system introducing the charged particle beam to the irradiation unit in the selected treatment room, by using at least treatment room information representing the selected treatment room and treatment plan information specified depending on patient identification information.

3. A particle beam therapy system according to Claim 2, wherein one of said plurality of elements is a path switching device disposed at each of junctions between a beam path in said first beam transport system and beam paths in said plurality of second beam transport systems, and switching the beam path in which the charged particle beam is introduced.

4. A particle beam therapy system comprising:

a charged particle beam generator for emitting a charged particle beam;

a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

a first beam transport system connected to said charged particle beam generator and transporting the charged particle beam emitted from said charged particle beam generator;

a plurality of second beam transport systems provided respectively corresponding to said treatment rooms, connected to said first beam transport system, and transporting the charged particle beam transported through said first beam transport system to the corresponding irradiation units mounted to rotating gantries disposed in said treatment rooms;

a path switching device disposed at each of junctions between a beam path in said first beam transport system and beam paths in said plurality of second beam transport systems, and switching the beam path in which the charged particle beam is introduced; and

a control information forming unit for forming control command information, which is related to the path switching device for introducing the charged particle beam to the irradiation unit in the selected treatment room, by using at least treatment room information representing the selected treatment room and treatment plan information specified depending on patient identification information.

5. A particle beam therapy system according to Claim 4, wherein said control command information does not include control information for the other path switching devices than said path switching device for introducing the charged particle beam to the irradiation unit in the selected treatment room.

6. A particle beam therapy system comprising:  
a charged particle beam generator for emitting a charged particle beam;  
a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms; and

a control information forming unit for forming control command information, which includes at least energy information for the charged particle beam exiting from said charged particle beam accelerator and excitation information for a plurality of electromagnets disposed in the beam path introducing the charged particle beam to the irradiation unit in the selected treatment room, by using at least treatment room information representing the selected

treatment room and treatment plan information specified depending on patient identification information.

7. A particle beam therapy system according to Claim 6, wherein said control command information does not include excitation information for other electromagnets than said electromagnets disposed in said beam path.

8. A particle beam therapy system comprising:

a charged particle beam generator for emitting a charged particle beam;

a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms; and

a control information forming unit for forming control command information, which includes control information for a plurality of first elements disposed in said charged particle beam generator and control information for a plurality of second elements disposed in the beam path introducing the charged particle beam to the irradiation unit in the selected treatment room, by using at least treatment room information representing the selected

treatment room and treatment plan information for a patient whom the charged particle beam is irradiated in the selected treatment room.

9. A particle beam therapy system according to Claim 2, wherein said control command information does not include control information for the other elements than said elements disposed in said beam path.

10. A particle beam therapy system according to Claim 8, wherein said control command information does not include control information for the other elements than said elements disposed in said beam path.

11. A particle beam therapy system according to Claim 2, further comprising a storage for storing the treatment plan information, wherein the treatment plan information specified depending on the patient identification information is information taken from said storage into said control information forming unit by using the patient identification information.

12. A particle beam therapy system according to Claim 4, further comprising a storage for storing the treatment plan information, wherein the treatment plan information specified depending on the patient identification information is information taken from said storage into said control information forming unit by using the patient

identification information.

13. A particle beam therapy system according to Claim 6, further comprising a storage for storing the treatment plan information, wherein the treatment plan information specified depending on the patient identification information is information taken from said storage into said control information forming unit by using the patient identification information.

14. A particle beam therapy system comprising:  
a charged particle beam generator for emitting a charged particle beam;

a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms;

a control information forming unit for forming control command information, which includes at least energy information for the charged particle beam exiting from said charged particle beam accelerator and excitation information for a plurality of electromagnets disposed in the beam path introducing the charged particle beam to the irradiation

unit in the selected treatment room, by using at least treatment room information representing the selected treatment room and treatment plan information specified depending on patient identification information; and

said electromagnets supplied with excitation currents controlled based on said control command information.

15. A particle beam therapy system according to Claim 2, further comprising a plurality of detectors for outputting detected signals representing respective statuses of said plurality of elements; and

an information confirming unit for confirming that element status information based on the detected signals from said plurality of detectors are matched with said control command information, and outputting confirmation information resulting from the confirmation.

16. A particle beam therapy system according to Claim 2, further comprising a controller for, based on said control command information, controlling said elements disposed in said beam path introducing the charged particle beam to the irradiation unit in the selected treatment room.

17. A particle beam therapy system according to Claim 4, further comprising a controller for, based on said control command information, controlling said path switching device for introducing the charged particle beam to the irradiation unit in the selected treatment room.



18. A particle beam therapy system according to Claim 6, further comprising a controller for, based on said control command information, controlling said electromagnets disposed in said beam path introducing the charged particle beam to the irradiation unit in the selected treatment room.

19. A particle beam irradiating method for irradiating a charged particle beam emitted from a charged particle beam generator to a patient in selected one of a plurality of treatment rooms by an irradiation unit in the selected treatment room, the irradiating method comprising the steps of:

forming a control command information by using treatment plan information specified depending on patient identification information representing said patient who has entered the selected treatment room, and treatment room information representing the selected treatment room;

forming a beam transport path, which is extended from said charged particle beam generator to said irradiation unit in the selected treatment room, by using said control command information; and

irradiating the charged particle beam introduced through the formed beam transport path to said patient by said irradiation unit in the selected treatment room.

20. A particle beam therapy system comprising:  
a charged particle beam generator for emitting a

charged particle beam;

a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms;

first element groups disposed respectively in said beam paths;

a control information forming unit for forming control command information for the first element group disposed in the beam path extended into the selected treatment room; and

an information confirming unit for selecting, from among element information including status information representing respective statuses of said first element groups, the status information of said first element group in the beam path extended into the selected treatment room, and confirming that the selected status information is matched with the control command information for the relevant first element group, which is included in said control command information.

21. A particle beam therapy system comprising:

a charged particle beam generator for emitting a charged particle beam;

a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms;

first element groups disposed respectively in said beam paths;

a control information forming unit for forming control command information including control information for a plurality of first elements included in the first element group in the beam path extended into the selected treatment room; and

an information confirming unit for selecting, from among element information including detected status information of respective first elements, the status information of the first elements included in the first element group in the beam path extended into the selected treatment room, and confirming that the selected status information is matched with the control information for the relevant first elements, which is included in said control command information.

22. A particle beam therapy system comprising:  
a charged particle beam generator for emitting a

charged particle beam;

a plurality of treatment rooms in each of which an irradiation unit for irradiating the charged particle beam is disposed;

a charged particle beam transport apparatus having a plurality of beam paths, communicated with said charged particle beam generator, and transporting the charged particle beam emitted from said charged particle beam generator separately to said respective irradiation units in said plurality of treatment rooms;

first element groups disposed respectively in said beam paths, and a second element group disposed in said charged particle beam generator;

a control information forming unit for forming control command information including control information for a plurality of first elements included in the first element group in the beam path extended into the selected treatment room, and control information for a plurality of second elements included in the second element group; and

an information confirming unit for selecting, from among element information including detected status information of respective first elements and detected status information of respective second elements, the status information for said first element group in the beam path extended into the selected treatment room and the status information for said second element group, and confirming that the selected status information is matched with the control information for the relevant elements, which is

included in said control command information.

23. A particle beam therapy system according to Claim 20, wherein said information confirming unit outputs an emission authorization signal after making said confirmation.

24. A particle beam therapy system according to Claim 21, wherein said information confirming unit outputs an emission authorization signal after making said confirmation.

25. A particle beam therapy system according to Claim 22, wherein said information confirming unit outputs an emission authorization signal after making said confirmation.

26. A particle beam therapy system according to Claim 44, further comprising:

a first element controller for outputting the control information for said first elements in said first element group, which is included in the control command information outputted from said control information forming unit; and

an element information confirming unit for confirming that the detected status information of said first elements is matched with the control information for said first elements.

27. A particle beam therapy system according to Claim 26, further comprising:

a plurality of shutters provided respectively in said

plurality of beam paths and shutting off the corresponding beam paths; and

a safety device for generating a beam stop signal for stopping the charged particle beam when said confirmation has not been made by said element information confirming unit, thereby closing the shutter provided in said beam path extended into the selected treatment room in response to said beam stop signal.

28. A particle beam therapy system according to Claim 22, further comprising:

a first element controller for outputting the control information for said first elements in said first element group, which is included in the control command information outputted from said control information forming unit;

a second element controller for outputting the control information for said second elements in said second element group, which is included in the control command information outputted from said control information forming unit;

a first element information confirming unit for confirming that the detected status information of said first elements is matched with the control information for said first elements; and

a second element information confirming unit for confirming that the detected status information of said second elements is matched with the control information for said second elements.

29. A particle beam therapy system according to Claim 28, further comprising:

a plurality of shutters provided respectively in said plurality of beam paths and shutting off the corresponding beam paths; and

a safety device for generating a beam stop signal for stopping the charged particle beam when said confirmation has not been made by any of said first element information confirming unit and said second element information confirming unit, thereby closing the shutter provided in said beam path extended into the selected treatment room with said beam stop signal.

30. A particle beam irradiating method for irradiating a charged particle beam emitted from a charged particle beam generator to a patient in selected one of a plurality of treatment rooms by an irradiation unit in the selected treatment room, the irradiating method comprising the steps of:

forming control command information for one of element groups disposed in a plurality of beam paths, which are communicated with said charged particle beam generator and transport the charged particle beam emitted from said charged particle beam generator to corresponding ones of said plurality of treatment rooms, the one of said element groups being disposed in the beam path extended into the selected treatment room; and

selecting, from among element information including

status information representing respective statuses of said element groups, the status information of the element group in the beam path extended into the selected treatment room, and confirming that the selected status information is matched with said control command information.